

### ABSTRACT

5 The present invention is a micro-cavity laser and methods related thereto. In the preferred  
embodiments, the micro-cavity laser comprises a laser pump signal in a fiber waveguide which is  
optically coupled to a micro-cavity resonator through a fiber taper. The micro-resonator includes  
a gain medium necessary for lasing action. The lasing frequency can be determined based upon the  
gain medium, the micro-cavity structure, as well as frequency selective elements such as gratings  
10 incorporated into the micro-cavity. The tapered fiber waveguide permits the micro-cavity laser to  
operate without a break in the fiber waveguide. In the preferred embodiments, the micro-cavity  
resonator is constructed from a doped silica or a semiconductor material. The present invention  
provides a compact laser with improved emissions and coupling efficiencies. Alternative  
configurations include multiple micro-cavities on a single fiber waveguide and/or utilizing multiple  
waveguides attached to one or more micro-cavity resonators. The laser can be made to operate in  
15 a continuous-wave as opposed to self-pulsing mode.